UNIVERSITI TEKNOLOGI MARA

IOT-BASED FERTIGATION SYSTEM

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ABSTRACT

The Fertigation, the precise application of water and fertilizers in agriculture, has evolved with the integration of Internet of Things (IoT) technology. This abstract outlines an IoT-based fertigation system, focusing on key components like the ESP32 (ESPDuino-32), MDD3A Cytron motor driver, EC sensor, and water pump, and emphasizes its advantages.The IoT system incorporates various sensors, including those for soil moisture, temperature, humidity, nutrients, and Ph. These sensors provide real-time data about the crops' environment, which is then sent to a central hub or cloud platform. Advanced algorithms and machine learning processes this data to determine the ideal irrigation and fertilization needs. Decision-making algorithms, considering factors like plant type, growth stage, and soil conditions, guide the system in adjusting solenoid valves through the MDD3A Cytron motor driver and the water pump for precise delivery.The ESP32 (ESPDuino-32) acts as the central controller, managing data acquisition and communication with the cloud platform. It integrates the MDD3A Cytron motor driver for water pump control and the Ph sensor to monitor soil acidity or alkalinity. Using advanced algorithms and machine learning techniques, the system nalyses the collected data to determine optimal irrigation and fertilization requirements. Decision-making algorithms consider factors such as plant type, growth stage, soil composition, and environmental conditions. Based on these insights, the system automatically adjusts the irrigation and fertilization processes by controlling actuators such as solenoid valves or pumps

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Table of Contents

CHAPTER 1
INTRODUCTION

1.1 Research Background

Fertigation, a cutting-edge technique in agriculture, combines irrigation with fertilization to provide crops with a lot of water and nutrients. This approach has become increasingly popular for its ability to boost crop health and yield while conserving resources. Thanks to innovations in IoT (Internet of Things) technology, fertigation systems have evolved to include sensors placed in the crop or yield which continuously gather data on moisture levels, nutrient content, temperature, and soil acidity.

In this IoT-based fertigation system, components like the ESP32 (ESPDuino-32) microcontroller serve as the central control hub, managing data acquisition and communication with the cloud platform. The ESP32 integrates seamlessly with other components, such as the MDD3A Cytron motor driver, responsible for controlling the water pump, and the Ph sensor, which monitors soil acidity. These components work in harmony to ensure precise delivery of water and nutrients to the crops.

This real-time data collected by the sensors is transmitted wirelessly to the ESP32, where it's analyzed using advanced algorithms. Farmers can then access this information remotely via a cloud platform, allowing them to make informed decisions about when and how much water and fertilizer to apply. Additionally, the integration of IoT technology allows farmers to remotely monitor and manage their fields from anywhere with an internet connection, offering unprecedented convenience and flexibility.

By harnessing the power of IoT-enabled fertigation systems, farmers can optimize resource usage, reduce waste, and promote sustainable farming practices. This not only leads to healthier crops and increased yields but also contributes to environmental conservation efforts. Overall, the marriage of fertigation and IoT technology, with components like the ESP32, MDD3A Cytron motor driver, and Ph sensor, represents a